an electronic circuit is expressed in terms of the number of particles present in connection pipes and the movement of the particles in the connection pipes, wherein the connection pipes represent wiring lines, the movement of the particles represents current, and the number of particles present represents voltage. According to the method of the claimed present invention, a rule representing an electric function is determined in accordance with the state of the connection pipes. Based on this rule, the "number of particles present in a given connection pipe" and the "number of particles passing through a given connection pipe" are determined (or updated). In particular, it should be noted that the claimed present invention does not perform simulation based on current or voltage but rather based on "particles."

Rohrer et al, by contrast, merely discloses a simulating technique corresponding to the prior art described in the Background of the Invention portion of the specification of the present application. This is prior art technique merely utilizes algorithms of SPICE, and is well known. That is, the prior art technique of Rohrer et al applies the formula V = IR to each of a plurality of circuit elements to formulate simultaneous equations, and the voltage value and the current value corresponding to each circuit element is obtained by means of these simultaneous equations. Where the number of circuit elements is N, for example, the number of simultaneous equations required is as many as N2. This does not become a problem in the case of a small-scale

circuit bearing approximately 10 circuit elements. However, recent LSI circuits contains a hundreds or even tens of thousands of circuit elements. A large number of simultaneous equations corresponding to these circuits cannot be solved in a short time, and in fact in such cases simulation is often impossible utilizing the prior art technique of Rohrer et al.

According to the claimed present invention, by contrast, only one formula is required to identify the function of an element. In other words, the number of formulas required is about N when the number of circuit elements is N. Thus, in the case of a small-scale circuit having approximately 10 circuit elements, the processing speed utilizing the simulation method of the claimed present invention and the processing speed utilizing the conventional SPICE technique do not differ greatly from each other. However, in the case of a large-scale circuit (e. g., such as an LSI) containing a few hundred to tens of thousands of circuit elements, the processing speed utilizing the simulation of the claimed present invention is dependent on only about N formulas, whereas the processing speed utilizing the conventional SPICE technique is dependent on about N2 formulas. This results in a significant difference in processing time. The method of the claimed present invention therefore enables simulation of a large-scale circuit (e.g., such as an LSI) to be finished in a short time. Indeed, the method of the claimed present invention enables simulation of large-scale IC's and LSI's (which are now

mainstream in the present electronics industry) whose simulation had been given up as being unexecutable utilizing conventional simulation techniques.

It should also be noted that the formulas solved by the method of the claimed present invention are not simultaneous equations. This means that the entirety of the circuit for which simulation is executed is not necessarily in the complete state (i.e., the closed state). By contrast, the conventional SPICE technique such as the technique disclosed in Rohrer et al cannot solve simultaneous equations unless the entirety of the circuit is in the complete state (closed state).

In summary, it is respectfully submitted the simulation technique of the claimed present invention which utilizes "particle" number and movement fundamentally differs from the conventional simulation technique such as the technique disclosed in Rohrer et al which utilizes algorithms of SPICE. All of the claims of the present application recite methods, apparatuses and/or programs for performing simulation based on "particles", and Rohrer et al does not at all disclose, teach or even remotely suggest utilizing "particles" to perform simulation.

Accordingly, it is respectfully submitted that the simulation methods, apparatuses, and programs of the present invention as recited in claims 1-24 patentably distinguish over Rohrer et al, taken singly or in combination with Going et al, under 35 USC 102 as well as under 35 USC 103.

In view of the foregoing, entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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